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10/518,662	12/17/2004	Robert Alan Cottis	7234-108	8530
30565 7590 12/03/2009 WOODARD, EMHARDT, MORIARTY, MCNETT & HENRY LLP 111 MONUMENT CIRCLE, SUITE 3700 INDIANAPOLIS, IN 46204-5137				
EXAMINER				
DINH, BACH T				
ART UNIT		PAPER NUMBER		
1795				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DocketDept@uspatent.com

### Office Action Summary

**Application No.**

10/518,662

**Applicant(s)**

COTTIS, ROBERT ALAN

**Examiner**

BACH T. DINH

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/CD)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Summary*

1. This is the response to the communication filed on 08/03/2009.
2. Claims 1-10 remain pending in the application.
3. The application is not in condition for allowance.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
6. Claims 1 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6,320,395) in view of Dawson et al. (US 5,425,867).

Addressing claims 1 and 10, Bosch discloses a method and an apparatus configured for monitoring corrosion of a working electrode (1:13-17), wherein an alternating perturbation signal of at least one frequency is applied to the working electrode (2:30-39,

applying two sinusoidal signals having different frequencies to the system, which contains the working electrode 145, figure 5), a signal representing the response of the working electrode to the applied perturbation signal is monitored (2:42-45, analyzing the response current measured at different frequencies). The current and potential output in response to the applied perturbation signal are measured (5:45-57, figure 5,  $i_{out}$  and  $E_{out}$ ). Bosch is silent regarding the monitored signal is filtered to separate out a signal representing the response of the electrode to the or each applied frequency and an electrochemical noise output signal representative of corrosion at the working electrode. Dawson discloses a method and an apparatus for monitoring corrosion at the working electrode 2 by monitoring the potential and current noise signals in the frequency range of 0.5 mHz to 1 Hz (4:58-60). Furthermore, filters are provided to separate out the current noise signal and potential noise signal at a desired frequency (2:66-3:9). Bosch and Dawson are analogous arts for they disclose methods and apparatuses for determining corrosion of a system. At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the method and apparatus of Bosch with the method of analyzing the corrosion of the working electrode by monitoring the electrochemical potential noise and electrochemical current noise by filtering the output signals to obtain the current noise and potential noise within a predetermined frequency range as disclosed by Dawson because doing so would allow one to determine the degree of localized corrosion attack, pitting and stress corrosion cracking (Dawson, 5:6-10) as well as the rate of corrosion disclosed by Bosch (Bosch, 2:33-39).

7. Claims 2-4 and 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6,320,395) in view of Dawson et al. (US 5,425,867) as applied to claims 1 and 10 above, and further in view of Roarty et al. (US 5,323,429).

Addressing claims 2-3, Bosch discloses the applied perturbation signal is a potential perturbation at different frequencies (5:4-7, figure 5) and the current and potential in response to the applied perturbation signals is measured (5:53-57, figure 5).

Bosch is silent regarding a measure of impedance is derived from the applied perturbation signal and the response signal.

Roarty discloses monitoring stress-corrosion damage; wherein, electrochemical impedance is measured by analyzing the response of the corrosion interface to an applied sinusoidal potential waveform over a range of frequencies (7:8-11).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the method of Bosch with the method of measuring the impedance of Roarty because doing so would allow one to determine the resistance/capacitance characteristics of the corroding surface (Roarty, 7:11-13).

In conjunction with the rejection of claim 1, the electrochemical current noise in response to the applied perturbation signals is measured according to the method of Dawson.

Furthermore, Dawson discloses the electrochemical potential noise can be measured from the measured impedance and the electrochemical current noise according to the equation  $|Z_w| = V_w/I_w$  (Dawson, 4:28-38).

With respect to the subject matter of claim 4, in conjunction with the rejection of claim 1, the electrochemical potential noise in response to the applied perturbation signals is

measured according to the method of Dawson. Therefore, the electrochemical current noise can also be measured from the measured impedance and the electrochemical potential noise by the above equation.

Addressing claim 8, Bosch discloses the alternating perturbation signal comprises one or more sinewaves (figure 1a).

Addressing claim 9, Bosch discloses the applied perturbing signal contains sinewaves with different frequencies or period (4:20-23, figure 1B applied perturbation signal 110) that has an integral multiple relationship to a frequency at which the electrochemical noise is sampled (figure 1B the measured response signal 120 also has similar sinewaves profile as the applied signal). Furthermore, Bosch discloses the response signal is measured with respect to the perturbation signals that are applied at multiples of same frequencies (1:62-67). Therefore, Bosch discloses perturbing signal contains sinewaves that have a period that has an integral multiple relationship to a frequency at which the electrochemical signal is sampled. Hence, in combination with the disclosure of Dawson where the electrochemical noise signals are sampled, the perturbing signal of Bosch would contain sinewaves that have a period that has an integral multiple relationship to a frequency at which the electrochemical noise signal is sampled.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6,320,395) in view of Dawson et al. (US 5,425,867) and Roarty et al. (US 5,323,429) as applied

to claims 2-4 and 8-9 above, and further in view of Gonzalez-Martin et al. (US 6,805,788) and Eden et al. (US 5,139,627).

Addressing claim 5, Bosch discloses an alternating potential control signal is generated (potential perturbation signal 110 generated by the computer 155, 5:45-49), the potential between the working electrode and a reference electrode exposed to the same environment as the working electrode is monitored (figure 5, the output potential is the potential between the working and reference electrodes). Bosch discloses the corrosion potential of the electrochemical cell is measured and the potentiostat is set to this value and the perturbation signal is fed to the potentiostat (5:45-59); therefore, Bosch discloses the need to keep the potential measured between the electrodes and the potential applied constant.

Bosch is silent regarding an alternating perturbation signal is applied through an auxiliary electrode which is exposed to the same environment as the working electrode such that the monitored potential is the same as the potential of the control signal and the applied current is monitored.

Gonzalez-Martin discloses an electrochemical sensor for measuring corrosion of a substrate; wherein, the corrosion of the substrate is measured by applying a small AC perturbation current and measure the voltage response (6:38-45). Furthermore, the electrochemical impedance is measured when the AC perturbation signal is applied between the substrate and the counter or auxiliary electrode (5:18-20); therefore, Gonzalez-Martin discloses a measure of the impedance of the working electrode is derived from the applied current signal and the response signal.

Eden discloses an alternative way of measuring the corrosion of an electrode; wherein, a current at constant potential is applied to an electrode array and the applied current is monitored to deduce the electrochemical corrosion effects (4:38-44).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the method of Bosch with the method of applying an AC current perturbation between the working and counter electrode as disclosed by Gonzalez-Martin and monitoring the applied current that provides constant potential in the electrode array as disclosed by Eden because doing so would give one an alternative method to detect the early stages of corrosion in the corroding system (Gonzalez-Martin, 5:13-15).

With regard to the cited limitation “the monitored current is filtered to separate out a signal represent the response of the electrode to the or each applied frequency and a signal which represents the electrochemical current noise”, this limitation is addressed above by the method of Dawson.

With regard to the cited limitation “a signal representing electrochemical potential noise is derived from the filtered signal and the derived impedance measure”, this limitation is addressed above where one can measure the electrochemical chemical potential noise based on the derived impedance and electrochemical current noise using the impedance equation of Dawson.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6,320,395) in view of Dawson et al. (US 5,425,867) and Roarty et al. (US 5,323,429) as applied to claims 2-4 and 8-9 above, and further in view of Gonzalez-Martin et al. (US 6,805,788).



Addressing claim 6, Bosch (figure 5), Dawson (figure 1) and Roarty (8:41-45) all disclose method of measuring corrosion using a system comprising three electrodes. Bosch, Dawson and Roarty are silent regarding the limitation of current claim. Gonzalez-Martin discloses an electrochemical sensor for measuring corrosion of a substrate; wherein, the corrosion of the substrate is measured by applying a small AC voltage perturbation and Measure the perturbation in the current response. Alternatively, the corrosion of the substrate can also be measured by applying a small AC current perturbation and measure the voltage response (6:38-45). Furthermore, the AC signal perturbation is applied between the substrate and the counter or auxiliary electrode. At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the method of Bosch by the method of applying a small AC current perturbation between the working and counter electrode and measure the potential between the working and reference electrode (figure 5 of Bosch, the potential between the working and reference electrodes is measured by digital voltmeter, 5:45-47) as disclosed by Gonzalez-Martin because doing so would allow one to detect the early stages of corrosion of the corroding system (Gonzalez-Martin, 5:13-20).

In conjunction with the rejection of claims 1-4, the voltage response is filtered to separate out a signal representing the response of the electrode to each applied frequency and a signal which represents electrochemical potential noise as disclosed by the method of Dawson.

With regard to the cited limitation “a measure of the impedance of the working electrode is derived from the applied perturbation signal and the response signal”, this limitation is addressed by the method of Roarty as addressed above in the rejection of claim 2.

With regard to the cited limitation “a signal representing electrochemical current noise is derived from the filtered signal and the derived impedance measure”, Dawson discloses the electrochemical current noise can be measured from the measured impedance and the electrochemical potential noise according to the equation  $|Z_w| = V_w/I_w$  (Dawson, 4:28-38).

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6,320,395) in view of Dawson et al. (US 5,425,867) and Roarty et al. (US 5,323,429) as applied to claims 2-4 and 8-9 above, and further in view of Syrett et al. (US 4,658,365).

Addressing claim 7, Bosch, Dawson and Roarty is silent regarding the alternating perturbation signal has a DC offset.

Syrett discloses a method for monitoring corrosion rate of metals; wherein, AC voltage perturbation with a frequency is superimposed on the DC protection voltage or the AC perturbation signal has a DC offset (2:25-32).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the method of Bosch with the AC perturbation signal that has a DC offset as disclosed by Syrett because doing so would allow one to calculate the free corrosion current density and the free corrosion potential (Syrett, 2:30-32).

***Response to Arguments***

11. Applicant's arguments filed 08/03/2009 have been fully considered but they are not persuasive.

With respect to Applicant's argument regarding the rejection of claims 1 and 10, the argument is not persuasive for the following reasons.

Firstly, it is not necessary for Dawson to explicitly disclose filtering the output potential and current signals into two signals for analysis because it is not Dawson's objective to analyze other signals besides the potential and current noises. Furthermore, Dawson was relied on solely for the method of analyzing the potential and current noises from the output potential and current to deduce the localized corrosion attack, which is applicable for the method of monitoring corrosion of Bosch because Bosch already discloses the process of measuring the output potential and current for the determination of corrosion rate and monitoring the potential and current noises of said signals as disclosed by Dawson would give one another parameter for characterizing the corrosion process; namely, localized corrosion.

Secondly, Bosch already discloses the process of monitoring the output current and potential; therefore, it is not necessary for one to modify the apparatus of Bosch with additional electrodes for measuring the output current and potential. Furthermore, such modification was not part of the rejection of claims 1 and 10. The modification as stated above includes monitoring the potential and current noises of the output current and potential signals of Bosch using the method of Dawson to deduce the localized corrosion.

Thirdly, Examiner recognizes that the method of Dawson does not require the application of perturbation signal. However, Dawson does not state that the perturbation signal should not be applied as alleged by the Applicant, Dawson merely discloses the method still works without the application of a perturbation signal without criticizing, discrediting or otherwise discouraging the application of a perturbation signal. Furthermore, the modification stated above does not require modifying the method of Dawson with the application of the perturbation signal. The modification stated above calls for measuring the potential and current noises from the output potential and current signals of Bosch in the manner disclosed by Dawson. Therefore, Applicant's argument is not applicable to the content of the rejection.

Fourthly, Applicant did not provide any evidence for the assertion that the application of two sinusoidal signals would mask the electrochemical noise. Additionally, Dawson does not disclose that the application of a perturbation signal or any signal would mask the electrochemical noises. Furthermore, Dawson measures the electrochemical noises are isolated from the output electrochemical signals that are generated spontaneously from the environment, which includes all the factors that are associated with the environment, and such exposure to the environmental factors does not mask the measured electrochemical noises. Hence, it is inconclusive that the application of the perturbation signals of Bosch would affect or mask the measured electrochemical noises according to the method of Dawson. Therefore, Applicant's argument regarding the masking of the electrochemical noises due to the application of the perturbation signals of Dawson is not persuasive.

Fifthly, Bosch discloses measuring the output responses at harmonic frequencies of the frequencies of the applied signals, which means the measured the frequencies of the output responses have the periods that are integer multiples of the applied signals (1:58-2:6 and 2:30-67). Therefore, Examiner maintains the position that the disclosed measured output responses at harmonic frequencies of the applied signals of Bosch is equivalent to the limitation "the perturbing signal contains sinewaves that have a period that has an integral multiple relationship to a frequency at which the electrochemical signal is sampled" for the word "integral" is interpreted as the close relationship between the period of the frequency of the measured electrochemical signals and the period of the applied sinewaves perturbation signals.

For the reasons stated above, Examiner maintains the position that the limitation of claims 1 and 10 are obvious over the combined disclosures of Bosch and Dawson.

### ***Conclusion***

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH T. DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/  
Supervisory Patent Examiner, Art Unit 1753

BD  
11/25/2009